



March 31, 2023

Test Letter #: 18050-01 REV 2 (Created with Reference to WL Report # 18052)

Applicant Name: Frederick Energy Products

Exempt RF Device: Personal Alarm Device (PAD)

FCC ID: QUI-BC-PAD-2

ISED ID: 11625A-BCPAD2

EUT Summary: The Personal Alarm Device is categorically excluded from SAR testing.

Time-Averaged Exclusion Threshold: FCC = 1 mW; ISED = 16.2 mW

FCC Reference: KDB 447498 DO4 Interim General RF Exposure Guidance v01, Section 2.1.2 – Per FCC Part §1.1307(b)(3)(i)(A), a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

ISED Reference: RSS-102, Issue 5 (3/2015) Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) – SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1 of the present document. These limits are provided below.

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW



Exclusion Limit for ISED Canada:

The limits of Table 1, as provided in RSS-102, Issue 5 are based on RF port conducted power, or EIRP, whichever is higher. The EUT transmitter has a frequency of 916.475 MHz. As such, the interpolated limit for 916.475 shall be calculated from the following:

$$y = y_1 + (x - x_1) \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

where,

- $x_1$  and  $y_1$  is the first set of coordinates (e.g., 835 MHz and 17 mW, respectively).
- $x_2$  and  $y_2$  is the second set of coordinates (e.g., 1900 MHz and 7 mW, respectively).
- $x$  is the EUT transmit frequency
- $y$  is the final limit (e.g., interpolated value).

therefore,

$$y = 17 + (916.475 - 835) * (7 - 17) \div (1900 - 835)$$

$$y = 16.235 \text{ mW}$$

further,

$$16.235 \text{ mW is the final limit for the 916.475 transmitter}$$

$$16.235 \text{ mW} = 12.1 \text{ dBm}$$

finally,

$$\text{dBm} = 10\text{LOG}(\text{mW})$$

$$\text{dBm} = 10\text{LOG}(16.235)$$

$$\text{dBm} = 12.1$$

as such,

- 16.2 mW is the SAR testing exemption limit for ISED Canada (time-averaged power)
- 12.1 dBm is the SAR testing exemption limit for ISED Canada (time-averaged power)



Exclusion Results:

The EUT transmitter has a Peak, 3-meter, field strength of 48,585 uV/m. This value shall be converted to antenna port RF conducted power. This feed-point power shall be adjusted for time-averaging, via a DCCF of 19.7 dB, which is derived from 20LOG(0.103). Please see WLL Test Report # 18052-01 for full details regarding the transmitter timing of this device. Please note that the EUT antenna has a maximum gain of -12.3 dBi. Additionally, the applicant has declared a production tune-up tolerance of ± 1.0 dB.

To demonstrate compliance,

$$\begin{aligned} \text{dBuV/m} &= 20\text{LOG}(\text{uV/m}) \\ \text{EIRP}_{\text{dBm}} &= \text{dBuV/m} + 20\text{LOG}(D_m) - 104.7 \\ P_{\text{dBm}} &= \text{EIRP}_{\text{dBm}} - G_{\text{dBi}} + \text{Production Tune-Up Tolerance} \\ P_{\text{mW}} &= 10^{(P_{\text{dBm}} \div 10)} \\ \text{mW} &= \text{Watts}(10^3) \end{aligned}$$

where,

$D_m$  is the measurement distance in meters  
 $P_{\text{dBm}}$  is the maximum conducted transmit power at the antenna port  
 $G_{\text{dBi}}$  is the maximum transmitting antenna gain

$$\begin{aligned} \text{3-meter Peak Field Strength} &= 48,585 \text{ uV/m} \\ \text{3-meter Peak Field Strength} &= 20\text{LOG}(48,585) = 93.73 \text{ dBuV/m} \\ \text{3-meter EIRP}_{\text{dBm}} &= 93.73 + 20\text{LOG}(3) - 104.7 = -1.43 \text{ dBm} \\ \text{Peak Power}_{\text{dBm}} &= -1.43 - (-12.3) + 1 = 11.87 \text{ dBm} \\ \text{AVG Power}_{\text{dBm}} &= 11.87\text{dBm} - \text{DCCF} \\ \text{AVG Power}_{\text{dBm}} &= 11.87 - 19.7 = -7.83 \text{ dBm} \\ \text{AVG Power}_{\text{dBm}} &= -7.83 \text{ dBm} \\ \text{AVG Power}_{\text{mW}} &= 10^{(-7.83 \div 10)} = 0.165 \text{ mW} \end{aligned}$$

finally,

$$\begin{aligned} \text{Peak EIRP}_{\text{dBm}} &= -1.43 \text{ dBm} \\ \text{Peak EIRP}_{\text{mW}} &= 0.72 \text{ mW} \\ \text{AVG EIRP}_{\text{dBm}} &= -21.13 \text{ dBm} \\ \text{AVG EIRP}_{\text{mW}} &= 0.0002 \text{ mW} \\ \\ \text{Peak } P_{\text{dBm}} &= 11.87 \text{ dBm} \\ \text{Peak } P_{\text{mW}} &= 15.38 \text{ mW} \\ \text{AVG } P_{\text{dBm}} &= -7.83 \text{ dBm} \\ \text{AVG Peak } P_{\text{mW}} &= 0.165 \text{ mW} \end{aligned}$$



Conclusion:

The FCC time-averaged SAR Exclusion limit is 1mW.

The Canada time-averaged SAR Exclusion limit is 16.2 mW.

The EUT has an average EIRP of 0.0002 mW.

The EUT has an average conducted power of 0.165 mW.

The Personal Alarm Device is excluded from SAR testing.

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